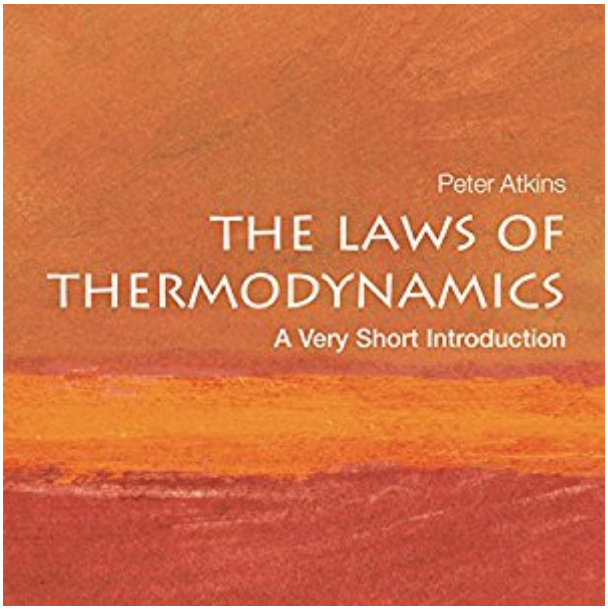
The Laws Of Thermodynamics: A Very Short Introduction



Synopsis

The laws of thermodynamics drive everything that happens in the universe. From the sudden expansion of a cloud of gas to the cooling of hot metal - everything is moved or restrained by four simple laws. Written by Peter Atkins, one of the world's leading authorities on thermodynamics, this powerful and compact introduction explains what these four laws are and how they work, using accessible language and virtually no mathematics. Guiding the listener a step at a time, Atkins begins with Zeroth (so named because the first two laws were well established before scientists realized that a third law, relating to temperature, should precede them - hence the jocular name Zeroth), and proceeds through the First, Second, and Third Laws, offering a clear account of concepts such as the availability of work and the conservation of energy. Atkins ranges from the fascinating theory of entropy (revealing how its unstoppable rise constitutes the engine of the universe), through the concept of free energy, and to the brink, and then beyond the brink, of absolute zero.

Book Information

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Customer Reviews

This is a terrific book, one that I would recommend to someone without a scientific background who just want to know a bit about thermodynamics, to a student (including high school students) just starting to learn about this subject, to graduate students who know quite a lot about it and even to teachers of the subject. I say this as one who has experienced the subject from all of these vantage points. I am a retired scientist (materials), but I still retain an interest in many scientific subjects, but

now from a more general viewpoint. I have studied thermodynamics both as an undergraduate and graduate student, I have used it professionally, and even used it in a graduate course that I taught. I therefore think that I can make this wholehearted recommendation from a reasonable vantage point, or more accurately vantage points.Professor Atkins begins with the zeroth law (and why this is not the first law) and a discussion of temperature. Then it is on to the first law and the concept of energy, the second law and the concept of entropy, the concept of free energy, and finally the third law and attaining absolute zero. All this material is treated in a clear manner, without the differential equations and derivations of equations that can make thermodynamics a complex subject. Instead, the reader is treated to an excellent discussion of what the laws mean and why they are so important. Even though I felt well versed in the subject I learned a lot and found a lot to think about. For instance, Professor Atkins provides the best explanation of enthalpy that I have ever come across. Most books just introduce it without going into why it was developed and where it fits into the general scheme of things, but Professor Atkins rectifies this.

This is an excellent introduction to the topic. As one other reviewer says (more or less), the laws of thermodynamics are going to hang in there right to the end, in the pantheon of our undertsandings of nature. They are so important, and as Sir Arthur Eddington said so long ago, the second law the most important in all of science. So they are well worth knowing about, for lay readers and thinkers even.I love to read a writer who comes across as obviously loving his subject. Peter Atkins does just this. He is so good to read, to learn from, so crystal clear, so logical, so plain in his uncluttered expression, so helpful. No wonder so many university students around the world have benefited from this man, as their lecturer, their teacher.Most of all I loved the explanation of entropy increase as increasing disorder, particles expanding into shelf-like areas of a box-like space. In this simple diagram and accompanying notes (pp.52-3) he gives the best metaphor for microstates and diversity I have seen.I presume he realises that his statement of the second law as the entropy of the universe increasing in the course of spontaneous change (p.49), when coupled with his defintion of spontaneous change as being when the entropy of the universe increases (p.51), together imply that the second law (as he states it) can be re-stated as: the entropy of the universe increases in the course of changes in which the entropy of the universe increases.I've given the book 5 stars because I can't find a way to award 4.5 and it's worth more than 4.

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